Fig. 1

start

read tail of queue pointer — 202

store data into buffer RAM — 204

get next entry from free ptr RAM — 206

store into next ptr RAM — 208

update tail of queue pointer — 210

increment link length counter — 212

done

Fig. 2
(write)

202

Tail

204

Tail → Buffer RAM

data

Buffer RAM

108a → NextValid

206

FreePtr RAM

208

Tail → NextPtr RAM
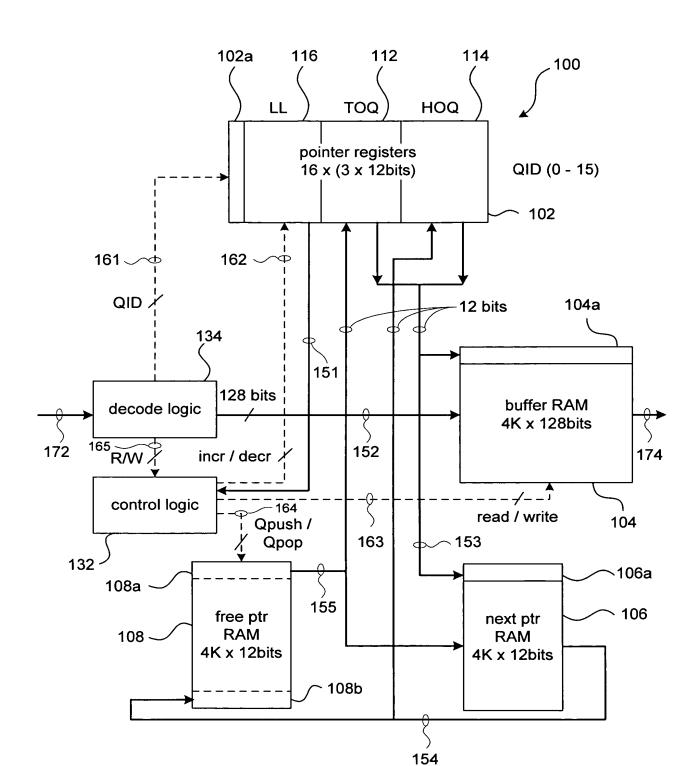
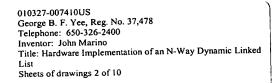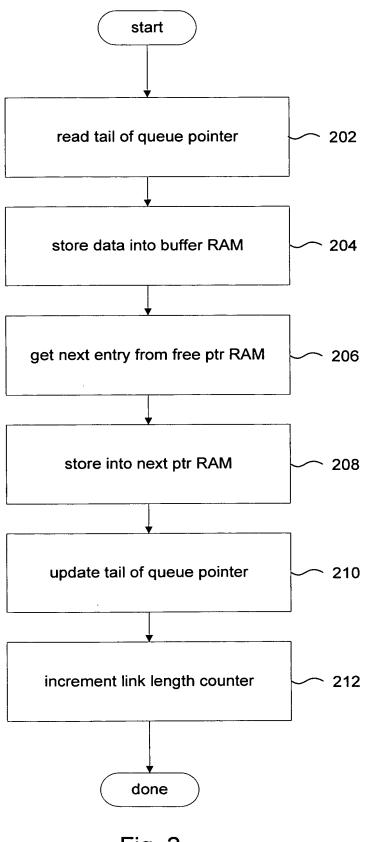NextValid

NextPtr RAM

210

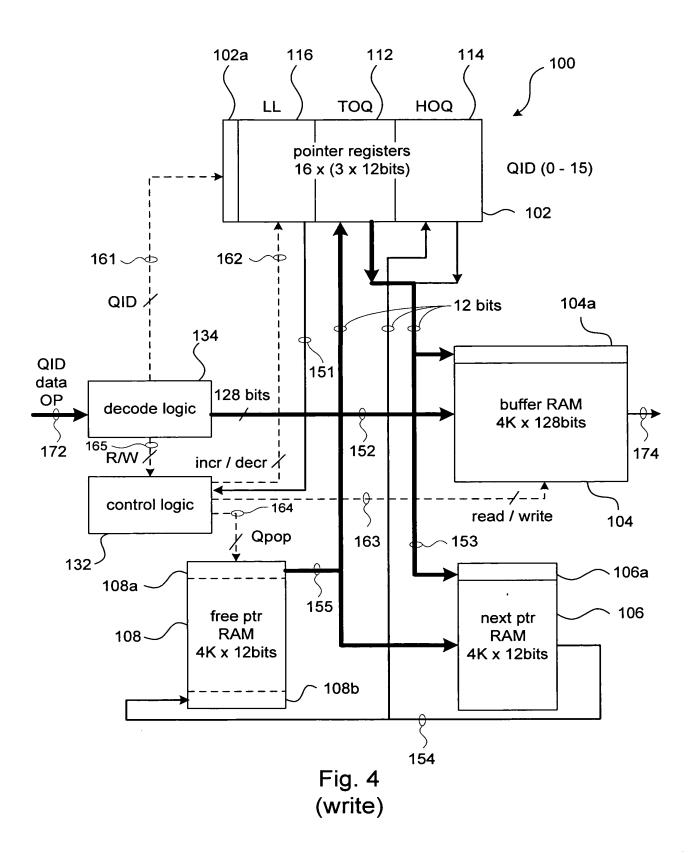Tail ← NextValid

Fig. 3

Fig. 4
(write)

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Inventor: John Marino
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```
              ┌─────────┐
              │  start  │
              └────┬────┘
                   │
                   ▼
    ┌──────────────────────────────┐
    │  read head of queue pointer  │──── 502
    └──────────────┬───────────────┘
                   │
                   ▼
    ┌──────────────────────────────┐
    │  access data from buffer RAM │──── 504
    └──────────────┬───────────────┘
                   │
                   ▼
    ┌──────────────────────────────┐
    │ get next entry from next ptr │──── 506
    │             RAM              │
    └──────────────┬───────────────┘
                   │
                   ▼
    ┌──────────────────────────────┐
    │    store into free ptr RAM   │──── 508
    └──────────────┬───────────────┘
                   │
                   ▼
    ┌──────────────────────────────┐
    │  update head of queue pointer│──── 510
    └──────────────┬───────────────┘
                   │
                   ▼
    ┌──────────────────────────────┐
    │ decrement link length counter│──── 512
    └──────────────┬───────────────┘
                   │
                   ▼
              ┌─────────┐
              │  done   │
              └─────────┘
```
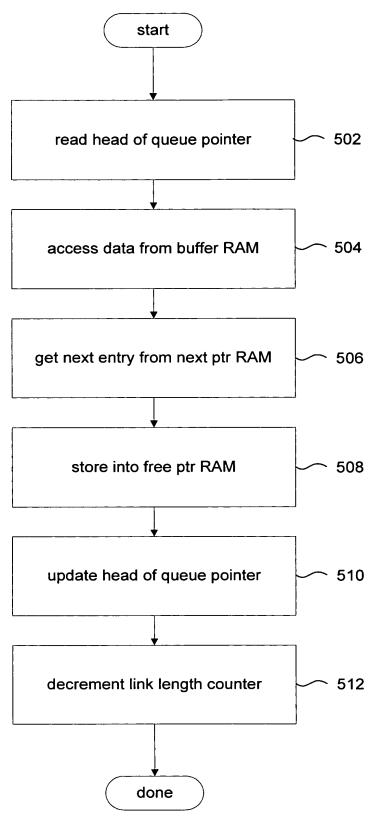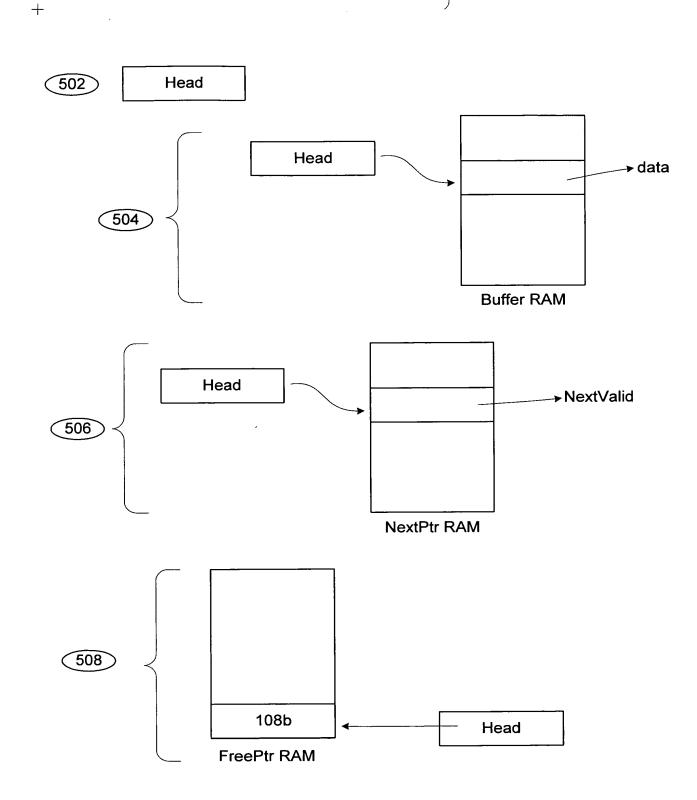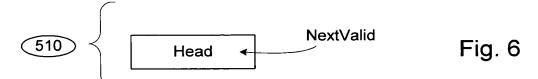
Fig. 5
(read)

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502 Head

504

Head → (Buffer RAM) → data

Buffer RAM

506

Head → (NextPtr RAM) → NextValid

NextPtr RAM

508

108b ← Head

FreePtr RAM

510 Head ← NextValid

Fig. 6

Fig. 7
(read)

Initial condition

f RAM				n RAM			b RAM	
T →	16							
	17							
	18							
	19							
	20							
	21							
	:							
B →	2^{12} - 1							

Fig. 8A

T1 = 1
bRAM (1) ← data1
pop fRAM = 16
nRAM(1) ← 16
T1 ← 16

	f RAM		n RAM			b RAM	
T →	16		1	16		1	data1
T →	17						
	18						
	19						
	20						
	21						
	:						
B →	2^{12} - 1						

Fig. 8B

T1 = 16
bRAM (16) ← data2
pop fRAM = 17
nRAM(16) ← 17
T1 ← 17

	f RAM		n RAM			b RAM	
	16		1	16		1	data1
T →	17						
T →	18						
	19						
	20						
	21		16	17		16	data2
	:						
B →	2^{12} - 1						

Fig. 8C

T3 = 3
bRAM (3) ← data3
pop fRAM = 18
nRAM(3) ← 18
T3 ← 18

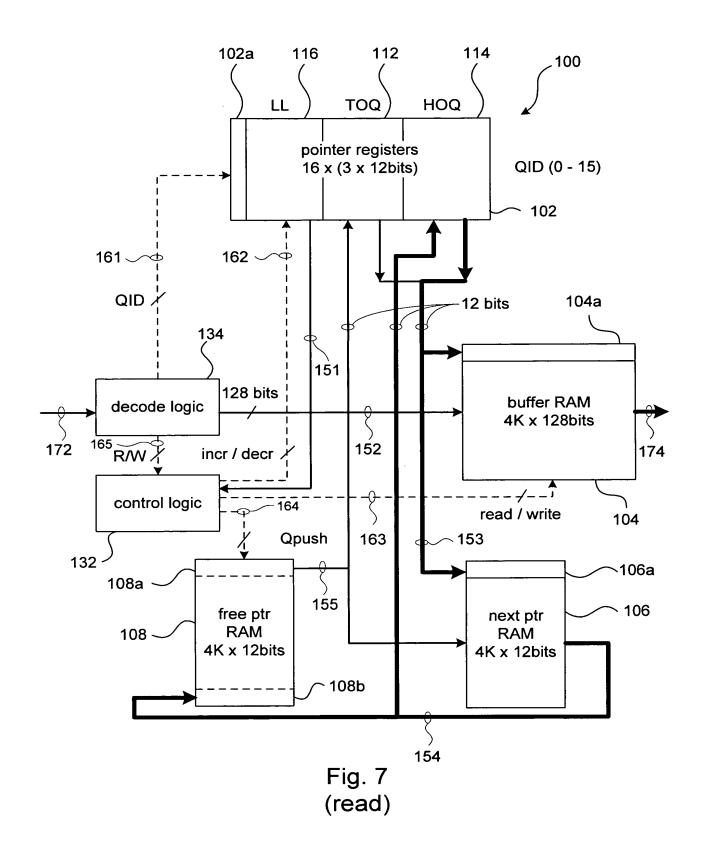|	f RAM		n RAM			b RAM	
	16		1	16		1	data1
	17		3	18		3	data3
T →	18						
T →	19						
	20						
	21		16	17		16	data2
	:						
B →	2^{12} - 1						

Fig. 8D

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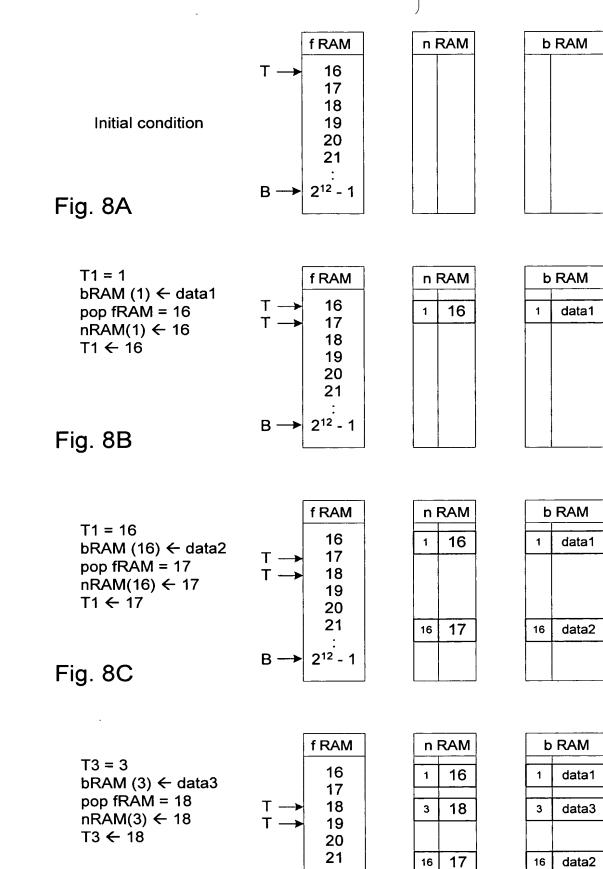Title: Hardware Implementation of an N-Way Dynamic Linked
List
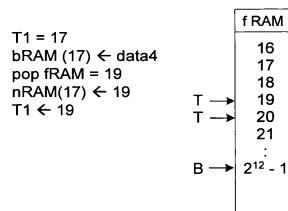Sheets of drawings 9 of 10

$T1 = 17$
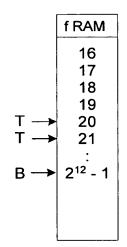$bRAM\ (17) \leftarrow data4$
$pop\ fRAM = 19$
$nRAM(17) \leftarrow 19$
$T1 \leftarrow 19$

f RAM

16
17
18
T → 19
T → 20
21
⋮
B → $2^{12} - 1$

n RAM

1	16
3	18
16	17
17	19

b RAM

1	data1
3	data3
16	data2
17	data4

Fig. 8E

$T3 = 18$
$bRAM\ (18) \leftarrow data5$
$pop\ fRAM = 20$
$nRAM(18) \leftarrow 20$
$T3 \leftarrow 20$

f RAM

16
17
18
19
T → 20
T → 21
⋮
B → $2^{12} - 1$

n RAM

1	16
3	18
16	17
17	19
18	20

b RAM

1	data1
3	data3
16	data2
17	data4
18	data5

Fig. 8F

$H1 = 1$
$bRAM\ (1) = data1$
$nRAM(1) = 16$
$fRAM \leftarrow H1\ (push)$
$H1 \leftarrow 16$

f RAM

16
17
18
19
20
T → 21
⋮
B → $2^{12} - 1$
B → 1

n RAM

1	16
3	18
16	17
17	19
18	20

b RAM

1	data1
3	data3
16	data2
17	data4
18	data5

Fig. 8G

Fig. 8H

$$H3 = 3$$
$$bRAM (3) = data3$$
$$nRAM(3) = 18$$
$$fRAM \leftarrow H3 \ (push)$$
$$H3 \leftarrow 18$$

f RAM

16
17
18
19
20
T → 21
.
$2^{12} - 1$
B → 1
B → 3

n RAM

1	16
3	18
16	17
17	19
18	20

b RAM

1	data1
3	data3
16	data2
17	data4
18	data5

Fig. 8I

$$H3 = 18$$
$$bRAM (18) = data5$$
$$nRAM(18) = 20$$
$$fRAM \leftarrow H3 \ (push)$$
$$H3 \leftarrow 20$$

f RAM

16
17
18
19
20
T → 21
.
$2^{12} - 1$
1
B → 3
B → 18

n RAM

1	16
3	18
16	17
17	19
18	20

b RAM

1	data1
3	data3
16	data2
17	data4
18	data5

Fig. 8J

$$T1 = 19$$
$$bRAM (19) \leftarrow data6$$
$$pop \ fRAM = 21$$
$$nRAM(19) \leftarrow 21$$
$$T1 \leftarrow 21$$

f RAM

16
17
18
19
20
T → 21
T → 22
.
$2^{12} - 1$
1
3
B → 18

n RAM

1	16
3	18
16	17
17	19
18	20
19	21

b RAM

1	data1
3	data3
16	data2
17	data4
18	data5
19	data6